Health and Biomedical Pillar

Development of an Automated, Real-Time Health Monitor and Emergency Alert System for the Elderly

Francis Enejo Idachaba 1 , Ejura Mercy Idachaba 2

1Department of Electrical and Information Engineering Covenant University Ota Ogun State. Nigeria, NG

2Covenant University Health Center, NG

1Department of Electrical and Information Engineering Covenant University Ota Ogun State. Nigeria, NG

https://doi.org/10.5339/qfarc.2016.HBPP3278

Published online: 21 Mar 2016

ARTICLE

The state of health of the elderly members of society and the fact that most of this group of persons either live alone or with family creates a need for constant monitoring as they are often times left alone for the greater part of the day when their hosts or family members have to go to work. The most common cause of death among the aged is heart related. Heath related medical emergencies range from heart attacks to strokes which happen suddenly leaving the victims with little or no ability to call for help. This system provides a means of monitoring the heart rate, temperature and blood pressure of the individual. It also has the capability of sending a pre stored message to the control center which passes it on to the nearest medical team or emergency response team indicating the location of the user, the vital signs and some medical history in the event of an emergency when the alert function is activated. These messages are sent using the GSM-SMS technology and are delivered within seconds of activation. The system can be provided by the health care providers, emergency response service providers, HMO and hospitals. The device is to be worn all times by the individuals such that they are monitored in real time. The system also has a panic

button which can be activated by the user for medical challenges other than heart related cases where the individual is not able to reach a phone. The system also incorporates a GPS receiver system capable of transmitting the location of the user in the event that the emergency occurred outdoors. The system provides a real time monitoring of the health conditions of the aged and enables a faster deployment of paramedics in the event of a medical emergency.

Introduction

A recent study of over 800 elderly citizens over 60 years in a middle east country showed that the prevalent medical challenges in the order of occurrence are hypertension (59.1%) followed by diabetes mellitus (57.3%), stroke (34.9%), dementia (28.5%), osteoarthritis (24.2%) and Alzheimer (21.4%). The females were observed to have a higher risk compared to the males for obesity (OR = 9.1; 95% CI = 3.51–12.8), followed by osteoporosis (OR = 8.7; 95% CI = 15.10–9.13) and fracture neck femur (OR = 3.9; 95 CI = 2.11–6.91). The result also showed that males are more susceptible to hypertension (OR = 1.4; 95% CI = 1.07–1.85), stroke (OR = 1.3; 95% CI = 1.08–1.89) and renal diseases (OR = 2.4; 95% CI = 1.25–4.54). The prevalence of Hypertension, diabetes and stroke can be monitored using heartbeat sensor and blood pressure sensor. This work utilizes sensors for monitoring the heartbeat, the blood pressure and the body temperature to detect the occurrence of a health emergency and thus enable the triggering of the appropriate response messages.

System design

The system design comprise of sensors for real-time monitoring of the patient and a microcontroller which integrates all the data from the sensor and determines when the patient is in an emergency condition. The system is registered to individual owners and the house address of the users and their medical history is stored in a database of the healthcare provider. The city to be covered by the system is regrouped into service areas with ambulance and paramedic teams located in each service area. In the event of a health crisis or a medical emergency from the user, the microcontroller interprets the sensor output and sends a message depending on the sensor message received from the user to the central control center. The control center working together Mobile operators generates a coarse location of the user and compares it with the user stored address. If the user is at home, the control center sends the user name and phone number to the response team. It also sends the address, basic medical details, the nature of the emergency, phone number of the next of kin to the nearest ambulance and paramedic team covering the service areas within which the user is located.

Publication Information